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ABSTRACT

The purpose of this voluntary product standard is to establish nationally recognized safety requirements and test methods for toys intended for use by children in age groups through 14 years. The standard relates to possible hazards that may not be readily recognized and which may be encountered in,normal use or after reasonably foreseeable abuse. Included are requirements concerning material quality; flammability; toxicology; packaging film; strings and elastics; electrical/thermal energy; implusive noise; edges; hazardous points; projections; wheels, tires, and axles; folding mechanisms and hinges; holes, clearances, and protection of mechanisms; stability of ride-on toys and seats; overload requirements for ride-on toys and seats; tipping of stationary floor toys; confined spaces; small objects; simulated protective devices such as helmets, hats, and goggles; projectiles; and labeling, literature and marking. Inspection and test procedures cover testing for hazardous substance content, preconditioning of toys to simulate shipping and storage, normal use testing, abuse testing, impact tests, bite tests, torque tests for removal of components, tension test for removal of components, compression test, tests for tire removal and snap-in wheel and axle assemblies removal, flexure test, test for mouth actuated toys, and impact test for toys that cover the face. Information regarding anthropometric data, packaging and shipping, and availability of documents referenced in the standard is contained in appendices A through C. A table to serve as a guide to the requirements contained in this standard as applicable to various toy categories is provided in appendix E. (Author/SB)

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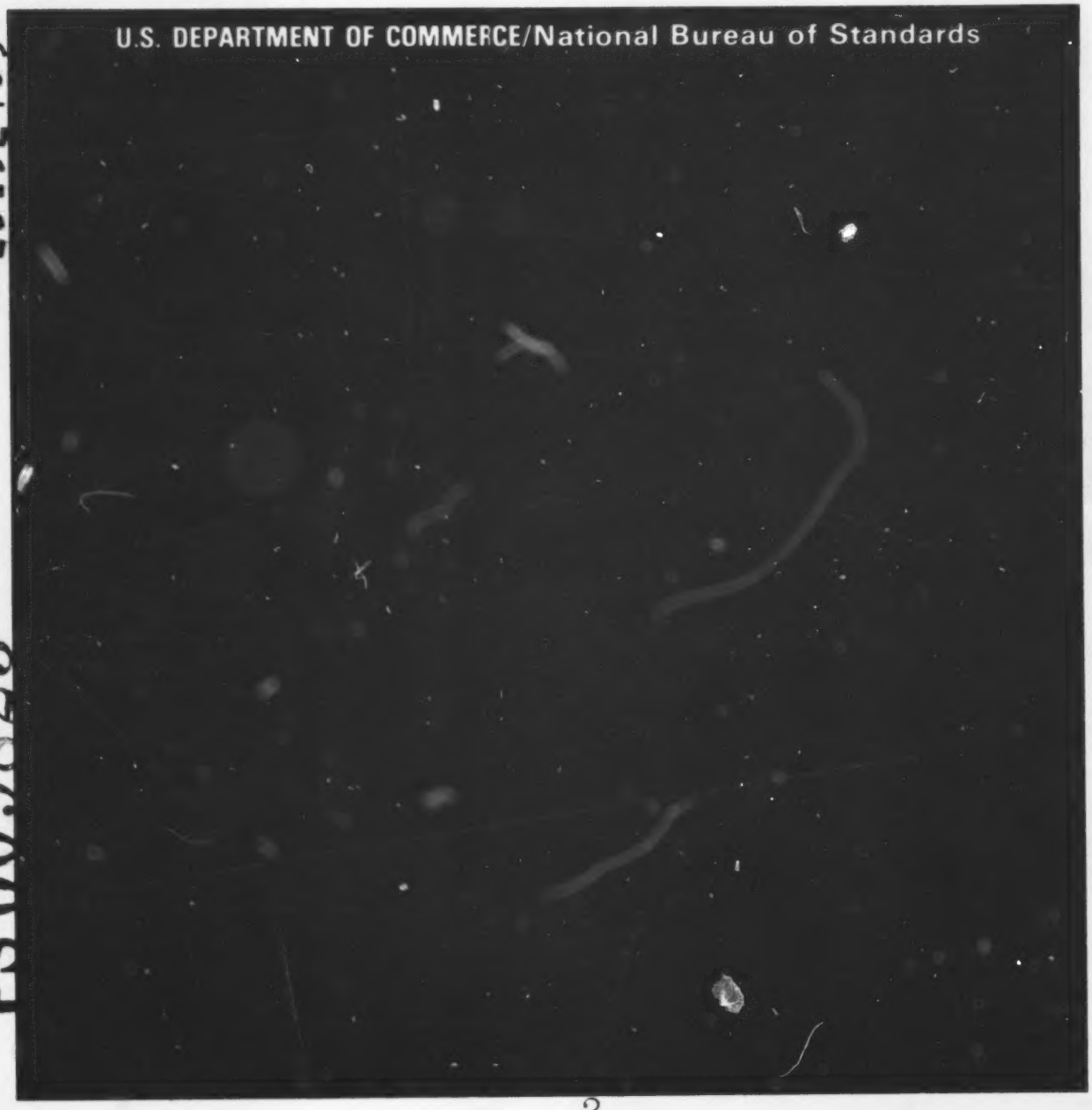
Voluntary Product Standard

PS 72-76



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Voluntary Product Standard
PS 72-76

Toy Safety

Approved by the American National Standards Institute on
March 8, 1977, as American National Standard ANSI/VPS PS 72–76

Abstract

The purpose of this Voluntary Product Standard is to establish nationally recognized safety requirements for toys intended for use by children in age groups through 14 years. The standard relates to possible hazards that may not be readily recognized by the public, and which may be encountered in the normal use for which a toy is intended, or after reasonably foreseeable abuse. Requirements are included for material quality; flammability; toxicology; packaging film; strings and elastics; electrical/thermal energy; impulsive noise; edges; hazardous points; projections; wheels, tires, and axles; folding mechanisms and hinges; holes, clearances, and protection of mechanisms; stability of ride-on toys and seats; overload requirements for ride-on toys and seats; tipping of stationary floor toys; confined spaces; small objects; simulated protective devices, such as helmets, hats, and goggles; projectiles; and labeling, literature, and marking.

Key words: Cautionary labeling for toys; hazardous characteristics of toys; safety, toy; toy safety; use and reasonably foreseeable abuse testing for toys.

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Errata No. 2 to Accompany Voluntary Product Standard PS 72-76,
"Toy Safety"

On page 5, section 4.7. Electrical/thermal energy, on second line change 15 volt to 115 volt ...

National Bureau of Standards
U.S. Department of Commerce
Washington, D.C. 20234

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Errata to Accompany Voluntary Product Standard PS 72-76,
"Toy Safety"

On page 19, section 5.10. Compression test, first sentence of second paragraph should read as follows:

> The loading device shall be a rigid metal disk 1.125 ± 0.015 inch in diameter and 0.375 inch in thickness.

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VOLUNTARY PRODUCT STANDARDS

Voluntary Product Standards are developed under procedures published by the Department of Commerce in Part 10, Title 15, of the Code of Federal Regulations. The purpose of the standards is to establish nationally recognized requirements for products, and to provide all concerned interests with a basis for common understanding of the characteristics of the products. The National Bureau of Standards administers the *Voluntary Product Standards* program as a supplement to the activities of the private sector standardizing organizations.

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For copies of the *Voluntary Product Standards* procedures or for more information concerning the development and use of these standards, you may write to: Standards Development Services Section, National Bureau of Standards, Washington, D.C. 20234.

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Toy Safety

Effective September 22, 1976 (See section 7.)

(This Standard, which was initiated by the Toy Manufacturers of America, is being developed under the *Procedures for the Development of Voluntary Products Standards* of the U.S. Department of Commerce.)

1. PURPOSE

The purpose of this Voluntary Product Standard is to establish nationally recognized safety requirements for toys. Although this Standard will not eliminate the need for the exercise of parental responsibility in selecting toys appropriate to the age of the child, or parental supervision in situations where children of various ages may have access to the same toys, its application will minimize accidents in the normal intended use and in reasonably foreseeable abuse of the toys covered by the Standard.

2. SCOPE

This standard relates to possible hazards that may not be readily recognized by the public, and which may be encountered in the normal use for which a toy is intended, or after reasonably foreseeable abuse. It does not purport to cover every conceivable hazard of a particular toy The Standard does not cover product performance or quality except as related to safety. Except for the labeling requirements pointing out the functional hazards and the age range for which the toy is intended, the Standard has no requirements for those aspects of a toy that present an inherent and recognized hazard as part of the function of the toy. Such an example is a sharp point necessary for the function of a needle. The needle is an inherent hazard that is well understood by the purchaser of a toy sewing kit, and this hazard is communicated to the user as part of the normal educational process.

On the other hand, while a tricycle has inherent hazards associated with its use (for example, falling off onto the sidewalk), the possible hazards associated with its construction (sharp edges, exposed mechanisms, etc.) will be minimized by the application of this Standard.

This Standard covers requirements and test methods for toys intended for use by children in age groups through 14 years. Different age limits for various requirements will be found in this Standard. These limits reflect the nature of the hazards and the expected mental and/or physical ability of the child to cope with the hazards.

Articles not covered by this Standard are:

- Bicycles
- Sling shots and sharp-pointed darts
- Crayons, paints, chalks, and other similar art materials
- Playground Equipment
- B-B guns
- Kites
- Hobby and craft items in which the finished item is not primarily of play value
- Model kits in which the finished item is not primarily of play value
- Sporting goods, camping goods, athletic equipment, musical instruments, and furniture; however, toys which are their counterparts are covered. (It is recognized that there often is a fine line between, for example, a musical instrument or a sporting item and its toy counterpart. The intention of the producer or distributor, as well as normal use and reasonably foreseeable abuse, determines whether the item is a toy counterpart or not).
- Powered models of aircraft, rockets, boats and land vehicles; however, toys which are their counterparts are covered

Information regarding anthropometric data, packaging and shipping, and the availability of documents referenced in the Standard is contained in appendices A through C. A table to serve as a guide to the requirements contained in this Standard as applicable to various toy categories is provided in appendix E.

Note: As an aid in correlating U.S. customary units to metric units, conversion factors for units in this Standard are given in appendix D.

3. DEFINITIONS

3.1. Accessible[1]—Accessible refers to any portion of a toy that can be contacted by a probe of the length and diameter as specified in table 1.

TABLE 1. *Dimensions of probes for defining accessibility*

Child age group	Insertion length of probe	Diameter of probe
months	*inches*	*inches*
18 or less	2	3/16
Over 18 but not over 60	2-1/2	1/4
Over 60 but not over 168	3	1/4

3.2. Burr—A burr is a roughness that may be found at an edge or joint of a toy or component if the material is not cleanly severed or finished.

3.3. Curled edge—A curled edge is one in which the portion of the sheet adjacent to the edge is bent into an arc and forms an angle of less than 90° with the base sheet, as shown in figure 1.

3.4. Discharge mechanism—A discharge mechanism is an inanimate system for releasing and propelling a projectile.

3.5. Edge, hazardous—A hazardous edge is defined as an edge that can cut a child's skin during normal use or reasonably foreseeable abuse of a toy. Such an edge is subjectively judged as hazardous if it appears sharp to the casual observer.[2]

3.6. Elastic—An elastic material is defined as one which will, essentially, instantaneously recover its former size and shape after being elongated at least 10 percent at a testing speed of not less than 20 inches per minute.

[1] This definition may be superseded by a definition which may be promulgated by the U.S. Consumer Product Safety Commission (CPSC). Meanwhile, the suggested articulated probe described in the proposed rules of the CPSC which were published in the *Federal Register* on January 7, 1975, (pages 1489 and 1491) could serve as a means to determine accessibility in addition to the method defined in 3.1. Information on the articulated probe is available from Underwriters' Laboratories Inc., 1285 Walt Whitman Road, Melville, New York 11746.

[2] This subjective definition may be superseded by a test method which may be contained in a regulation covering hazardous edges which may be promulgated by the Consumer Product Safety Commission as a mandatory test method. Until any mandatory regulation becomes effective, there are two suggested methods by which hazardous edges could be detected: (1) the test method in section 1500.47 of part 1500 of Title 16 of the Code of Federal Regulations proposed by the Consumer Product Safety Commission which was published in the *Federal Register* on January 7, 1975, or (2) the hazardous edge tester developed by Underwriters' Laboratories, Inc. Information on the availability of the first test device can be obtained from the Office of the Secretary, Consumer Product Safety Commission, 1750 K Street, NW., Washington, D.C. 20207; information on the second test device can be obtained from Underwriters' Laboratories, Electrical Standards Department, 1285 Walt Whitman Road, Melville, New York 11746. Neither of these methods are currently required by this Standard.

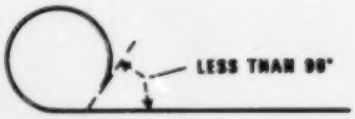

FIGURE 1. *Curled edge.*

3.7. Feathering—Feathering is a beveling of an edge (or decrease in thickness moving toward the edge) caused during shearing or cutting of material.

3.8. Flash—Flash is excess material which escapes between the mating parts of a mold assembly.

3.9. Folding mechanisms—Folding mechanisms are those having an assembly of hinged, pivoted, or sliding members that can produce a crushing, scissoring, pinching, or shearing action during the operation of the mechanisms.

3.10. Hazard—A hazard is defined as any characteristic of a toy that presents an unreasonable risk of injury or illness during normal use or as a result of reasonably foreseeable abuse.

3.11. Hemmed edge—A hemmed edge is one in which the portion of the sheet adjacent to the edge is folded back on the sheet itself through an angle of approximately 180°, so that the portion of the sheet adjacent to the edge is approximately parallel to the main sheet, as shown in figure 2.

FIGURE 2. *Hemmed edge.*

3.12. Hinge line clearance—The hinge line clearance is the clearance between the stationary portion of the toy and the movable portion along, or adjacent to, a line projected through the axis of rotation. Dimension A in figure 3 illustrates the hinge line clearance, using a box with a lid as an example.

3.13. Impulsive noise—An impulsive noise is one in which the variations in noise level involve maxima at intervals of greater than 1 second.

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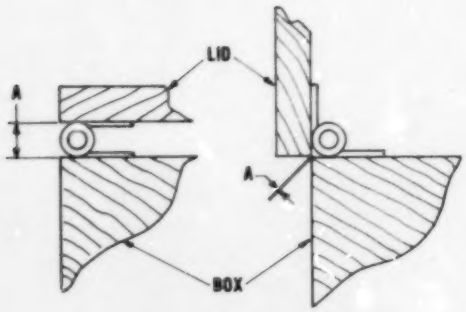


FIGURE 3. *Changing clearance at hinge line.*

3.14. Lap joint—A lap joint is one in which an edge overlaps a parallel surface but is not necessarily mechanically attached to it at all points long the length. Typical lap joints are shown in figure 4.

FIGURE 4. *Typical lap joints.*

3.15. Normal use—Normal use of a toy is defined as those play modes which conform to the instructions that accompany the toy, which have been established by tradition or custom, or which are evident from an examination of the toy.

3.16. Point, hazardous—A hazardous point is one that can puncture or lacerate a child's skin during normal use or reasonably foreseeable abuse. Such a point is subjectively judged as hazardous if it appears sharp to the casual observer.[3]

[3] This subjective definition may be superseded by a test method which may be contained in a regulation covering hazardous points which may be promulgated by the Consumer Product Safety Commission as a mandatory test method. Until any mandatory regulation becomes effective, hazardous points could be determined by the test method in section 1500.48 of part 1500 of Title 16 of the Code of Federal Regulations proposed by the Consumer Product Safety Commission which was published in the *Federal Register* on January 7, 1975. Information on the availability of this test device can be obtained from the office of the Secretary, Consumer Product Safety Commission, 1750 K Street, NW., Washington, D.C. 20207.

3.17. Projectile[4]—A projectile is an object propelled by means of a discharge mechanism that is capable of storing and releasing energy under the control of the operator. Included in this definition are unrestrained objects and objects which are restrained at the end of a string, such as those from pop-guns.

3.18. Projection, hazardous—A hazardous projection is one that, because of its material and configuration, appears to the casual observer to present a puncture hazard if a child should fall onto it.[5]

3.19 Protective cap or cover—A protective cap or cover is a component that is attached to a potentially hazardous edge or projection to reduce the possibility of injury.

3.20. Protective tip—A protective tip is a component that is attached to the impacting end of a projectile to minimize injury if it should impact on the body. A protective tip may perform other functions such as the prevention of damage to the projectile on striking a target, providing a means of attaching the projectile to the target as in the case of suction cups, or the prevention of damage to inanimate objects.

3.21. Reasonably foreseeable abuse—Reasonably foreseeable abuse is defined as conditions to which a child may subject a toy that are not normal use conditions and that are likely to be performed. Examples of abuse would result from (1) curiosity, such as deliberate disassembly, (2) lack of physical coordination or manual dexterity, such as dropping, and (3) use for a purpose for which the toy is not intended, such as use of a toy football helmet as if it were a real protective device.

3.22. Rigid—For the purposes of this Standard, rigid refers to any material that has a Young's modulus in tension of greater than 100,000 psi.

3.23. Rolled edge—A rolled edge is one in which the portion of the sheet adjacent to the edge is bent into an arc and forms an angle between 90° and 120° with the main sheet, as shown in figure 5.

[4] This definition may be superseded by a definition which may be promulgated by the U.S. Consumer Product Safety Commission.

[5] This definition, even though it is subjective, serves to alert producers, distributors, and others interested in toy safety of the possible dangers of projections. Hazardous projections can result from the usage of a toy or the position of the toy. Some projections serve a function, such as actuating levers; other projections serve no purpose (i.e., are nonfunctional) except for being decorative.

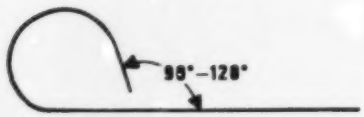


FIGURE 5. *Rolled edge.*

3.24. Toy—For the purposes of this Standard, the term toy is defined as any object designated, manufactured, or marketed as a plaything for children through the age of 14 years including miniature imitations (intended basically for play use) of objects intended primarily for a specific functional use.

4. REQUIREMENTS

4.1. General—Toys represented as complying with this Voluntary Product Standard shall meet all applicable requirements specified herein. The toys shall conform to requirements of the Standard after normal use and reasonably foreseeable abuse testing, as specified in the applicable paragraphs of section 5. Any mandatory regulations promulgated by the Consumer Product Safety Commission shall supersede any applicable requirements in section 4. Later issues of publications referenced in this Standard may be used providing the requirements are applicable and consistent with the issue designated. (All publications referenced in this Standard, are listed in appendix C along with information on how they may be obtained.)

4.2. Material quality—Toys shall be constructed of new material, of reprocessed material (such as reprocessed plastic, foam scrap, fibrous scrap from textile producers, and fabric trimmings from garment manufacture) that has been so refinied that the level of contamination from hazardous (as described in 4.4.1) substances does not exceed that found in new material.

4.3 Flammability—Textile fabrics including non-wovens used in toys or as components of toys shall comply with the requirements issued under the Flammable Fabrics Act as amended on August 23, 1954, (see *Rules and Regulations Under the Flammable Fabrics Act* published by the Consumer Product Safety Commisison); the method of test shall be in accordance with Commercial Standard CS 191-53, *Flammability of Clothing Textiles*. Materials other than textile materials which are part of the toy shall not be flammable as defined under Title 16, Code of Federal Regulations, Section 1500.3(c)(6) issued under the Federal Hazardous Substances Act.

4.4. Toxicology

4.4.1. Hazardous substances—Toys or materials used in toys shall conform to the Federal Hazardous Substances Act and to the regulations promulgated under that Act. Exemptions to this Act for certain types of toys are given in Title 16, Code of Federal Regulations, Section 1500.85. The regulations define limits for toxic, corrosive, irritant, sensitizing, pressure generating, and radioactive materials. Testing for hazardous substance content is given in 5.2.

4.4.2. Food and cosmetics—Food, simulated food such as doll food, and toys which are intended to be used in conjunction with food or in the preparation of food such as toy cooking utensils, and toy products intended to simulate cosmetics, shall conform to the *Requirements of the Federal Food, Drug, and Cosmetic Act.*

4.4.3. Handling and packaging of food—All food products supplied with toys shall be handled and packaged in compliance with Title 21, Code of Federal Regulations, Section 128, which is concerned with sanitation practices in the manufacture, processing, packaging, or holding of human foods.

4.4.4. Paints or other similar surface coating materials—Paints and other similar surface coating materials applied to toys shall comply with the lead content requirement of Title 16, Code of Federal Regulations, Section 1500.17 (a)(6) issued under the Federal Hazardous Substances Act. In addition, surface coatings shall not contain intentionally added ingredients, such as pigments or dyes, which are based on compounds of antimony, arsenic, cadmium, mercury, selenium, or water soluble barium.

4.4.5. Liquids—Liquids contained in toys shall conform to the requirements of the Federal Hazardous Substances Act. Any aqueous liquid shall conform to the bacteriological quality requirements of the U.S. Public Health Service for potable water. The requirements under the Federal Hazardous Substances Act are given in Part 1500 of Title 16, Code of Federal Regulations, and the bacteriological quality requirements are given in the *Public Health Service Drinking Water Standards*, 1962.

4.4.6. Stuffed toys—Loose fillers for stuffed toys shall be free of objectionable matter originating from insect, bird, rodent, or other animal infestation and of contaminants such as splinters and metal chips to the extent possible in good manufacturing practice. The test methods which shall be used to determine objectionable material

are in Chapter 44, *Extraneous Materials Isolation of Official Methods of Analysis of the Association of Official Analytical Chemists*, twelfth edition, 1975.

4.5. Packaging film—This requirement is intended to minimize the possibility of asphyxiation hazards that might be caused by thin packaging films. Flexible plastic film bags and flexible plastic sheets used as packaging materials for shelf packages or used with toys shall be at least 0.00150 inch in nominal thickness but the actual thickness shall never be less than 0.00125 inch. Thickness shall be determined in accordance with Method C of American Society for Testing and Materials (ASTM) D 374-68, *Standard Methods of Test for Thickness of Solid Electrical Insulation*. This requirement does not apply to the following:

a. Bags which have an opening perimeter less than 14 inches after the perimeter has been stretched to its fullest extent.

b. Bags which have an opening perimeter of 14 inches or greater, after the perimeter has been stretched to its fullest extent, in which the combined length and fully extended opening perimeter is less than 23 inches.

c. Shrink film of less than 0.00150 inch nominal thickness which is in the form of an overwrap that would normally be destroyed when the package is opened by a consumer.

4.6. Strings and elastics—These requirements are intended to minimize hazards that might be caused by flexible strings and elastics. The term "string" shall include monofilaments, plastic and textile tapes, and chains, as well as those fibrous materials commonly called string.

4.6.1. Crib and playpen toys—Flexible strings attached at one end to a toy intended for use in cribs or playpens shall be less than 12 inches in length. If a string is attached to form a loop, then the perimeter of the loop shall be less than 14 inches.

4.6.2. Pull toys—Flexible strings greater than 12 inches long for pull toys intended for children 36 months old or less shall not be provided with beads or other attachments that could tangle to form a loop.

4.6.3. Self-retracting pull strings—Strings used in string-actuated mechanisms for toys intended for use by children 18 months of age or less, except monofilament-type strings 1/16 inch or less in diameter, shall not retract when a weight of 2 pounds is attached to the fully extended string, with the string vertical and the toy held firmly in the most favorable position for retraction. Monofilament-type strings 1/16 inch or less in diameter shall not retract under a load of 1 pound, when tested in the manner described above.

4.6.4. Elastics—An accessible unaffixed portion of elastic in toys intended for children 36 months old or less shall not extend to more than 12 inches under a load of 5 pounds.

4.6.5. Strings and lines for flying devices—Kite strings and handheld lines over 6 feet long attached to flying devices intended for use as playthings shall have an electric resistivity of more than 10^8 ohm centimeters when tested at a relative humidity of not less than 45 percent and a temperature of not greater than 75° F when measured by a high voltage, resistance breakdown meter.

4.7. Electrical/thermal energy—Toys operating from nominal 15 volt branch circuits shall conform to Title 16, Code of Federal Regulations, Part 1505, issued under the Federal Hazardous Substances Act.

4.8. Impulsive noise—Toys shall not produce impulsive noises with an instantaneous overall sound pressure level exceeding 138 decibels (re 20 micro-newtons per square meter) when measured at any position 25 centimeters from the surface of the toy. The sound levels shall be determined by using the equipment described in Title 16, Code of Federal Regulations, Section 1500.47. When determining sound levels, both the toy and the test equipment shall be at least 1 meter from any wall, ceiling, or other large obstruction. The sound levels as specified herein shall not be exceeded after the toy is tested in accordance with the requirements of 5.4 through 5.10.

Note: This requirement does not apply to caps as described in Section 1500.18(a)(5) of Title 16, Code of Federal Regulations, issued under the Federal Hazardous Substances Act. Mandatory requirements for these caps are given under Section 1500.86 (a)(6) of Title 16, Code of Federal Regulations.

4.9. Edges—The requirements are intended to minimize hazards from edges. For those toys which are designed and specifically labeled for permanent assembly by an adult, these requirements are concerned with the toy after assembly. If a hazardous edge, such as a metal edge of less than 0.020 inch in thickness, is unprotected on an unassembled toy designed for adult assembly, the

outside of the package shall carry a label cautioning the purchaser to exercise care in unpacking and assembly, according to the requirements of 4.22.1.1. For those toys intended for assembly and disassembly in play by a child, these requirements apply to all parts that must be handled during assembly and disassembly and with the toy after assembly. Hazardous edges shall not be produced when the toy is tested according to 5.4 through 5.10.

4.9.1. Functional sharp edges—Toys in which a potentially hazardous sharp edge is a necessary part of the function of the toy shall carry cautionary labeling as specified in 4.22.1.1, if the toy is intended for use by children from 48 months to 96 months. Toys intended for children aged less than 48 months shall not have accessible hazardous functional sharp edges.

4.9.2. Molded toys—The accessible edges, corners, or mold parting areas of molded toys shall be free of hazardous edges produced by burrs and flash or so protected that hazardous edges are not exposed.

4.9.3. Metal toys—Metal parts less than 0.020 inch thick shall have the edges protected as described in 4.9.4. below, if the edges are accessible or become accessible as a result of normal use or reasonably foreseeable abuse. Metal edges of 0.020 inch or greater shall be free of hazardous burrs and feathering or so protected that hazardous edges are not exposed. If accessible holes or slots in sheet metal of less than 0.020 inch thickness admit a rod of ½-inch diameter, to a depth of greater than 0.030 inch, then the edges shall be protected in accordance with this requirement (Additional size requirements for holes are given in 4.14.2.)

4.9.4. Protection of metal edges—Accessible edges of metal less than 0.020 inch thick except those covered by 4.9.4.1, shall be protected by hemmed, rolled, or curled edges, or shall be covered with a device or finish. If caps, sleeves, or other devices, are used, they shall be subjected to the compression test in 5.10, regardless of whether or not they are accessible to flat-surface contact during the appropriate impact test(s) described under 5.6. Hemmed edges shall be closed to a gap of 0.030 inch or less and the cut edge shall not present hazards from feathering. Gaps on rolled or curled edges shall not exceed 0.060 inch between the bare edge and the base sheet. The gap restriction shall not apply to curled edges if the curled portion of the sheet describes an arc of greater than 360° as shown in figure 6. However, the gap at the point at which the curled edge has established a 360° arc shall not admit a ¼-inch-diameter probe when applied (1) with a force as measured by a compression gage of 2 pounds or (2) with a force equivalent to the weight of the toy, parallel with the main sheet.

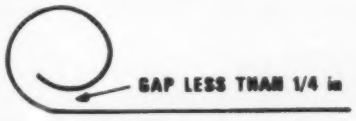


FIGURE 6. *Curled edge greater than 360°.*

4.9.4.1. Exemptions for 4.9.4.—Exempted are aluminum, copper, and lead foils. The edges at the ends of tubes, or the edges at the ends of formed sheet metal profiles, such as those at the ends of a curled edge as shown in figure 7(a), shall be exempt if the aperture will not admit a ¼-inch-diameter rod and is free of hazardous burrs and feathering. Also exempted are (1) leaf springs and (2) unprotected edges less than ⅜ inch in length at the end of a formed profile similar to that shown in figure 7(b) provided that the leaf springs and unprotected edges are free of hazardous burrs and feathering.[6]

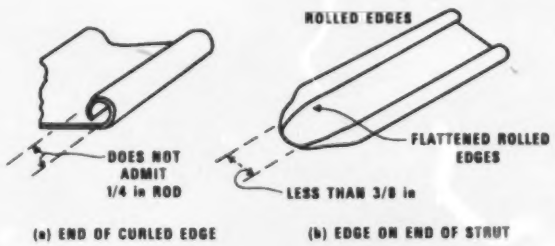


FIGURE 7. *Examples of exempted edges.*

4.9.5. Lap joints—If the gap between the sheet metal edge and the underlying surface in a lap joint exceeds 0.030 inch, the exposed sheet metal edge shall be protected as described in 4.9.4. The accessible surfaces shall be free of hazardous burrs and feathering.

[6] The exemptions given in this paragraph are common constructions which are not now judged to be hazardous. However, in the event that CPSC issues a mandatory test method for sharp edges, these exempted edges would be required to meet the requirements of CPSC.

4.9.6. Exposed bolts or threaded rods—If the ends of bolts or threaded rods are accessible, then the thread shall be free of exposed, hazardous, sharp edges and burrs, or the ends shall be covered by smooth finish caps so that hazardous sharp edges and burrs will not be exposed. Any caps which are used shall be subjected to the compression test in 5.10, regardless of whether or not the cap is accessible to flat-surface contact during the appropriate impact test(s) described under 5.6.

4.10. Hazardous points—These requirements are intended to eliminate unexpected hazards from sharp points that may occur because of the configuration of the toy, the assembly devices and fasteners such as wires, pins, nails, and staples that are improperly fastened; poorly sheared sheet metal; burrs on screws; and splintery wood. It is possible that hazardous sharp points could be produced or revealed in normal use or reasonably foreseeable abuse by the exposure of parts which were designed to be structurally protected. Examples would include the exposure of wire ends and pins or of fasteners through fracture of plastics or deterioration of wood. Hazardous points shall not be developed or become accessible after the toy has been tested in accordance with 5.4 through 5.10.

4.10.1. Nonfunctional points—Toys shall not have accessible potentially hazardous points unless the points are necessary for the function of the toy (see 4.10.2).

4.10.2. Functional points—Toys in which an accessible potentially hazardous point is a necessary part of the function of the toy, such as a needle in a sewing kit, shall carry cautionary labeling as specified in 4.22.1.1 if the toy is intended for children from 48 to 96 months old. Toys intended for children less than 48 months old shall not have accessible hazardous functional points.

4.10.3. Wires or rods—Wires or rods used in the interior of dolls or stuffed toys shall have their ends finished to avoid hazardous points and burrs, shall be turned back, or shall be covered with smoothly finished protective caps or covers, if they can become accessible after use or reasonably foreseeable abuse.

4.10.4. Wires or rods used as flexible skeletons—Metal wires or other metal materials used for stiffening or for retention of form in toys shall not fracture to produce an accessible point, edge, or projection hazard when tested according to 5.12, if the component can be bent through a 60° arc by the applicable maximum force. The maximum force (when applied perpendicularly to the major axis of the component at a point 2 ± 0.05 inches from the intersection of the component with the main body of the toy or at the end of the component if the component is less than 2 inches long) shall be as follows (within a tolerance of ± 0.5 pound):

10 pounds—toys intended for use by children 18 months in age or less
15 pounds—toys intended for use by children over 18 but not over 96 months of age

4.10.5 Wood—The accessible surfaces and edges of wood used in toys shall be free from splinters.

4.10.6. Nails and fasteners—Nails and fasteners shall not present a point, edge, ingestion, or projection hazard. The points of nails or fasteners shall not protrude so as to be accessible. Additional requirements for nails and fasteners used as axles are given in 4.12.

4.11. Projections—This requirement is intended to minimize possible puncture hazards that might be caused if a child should fall on rigid projections such as unprotected ends of axles, actuating levers, and decorative features. This requirement relates to potentially hazardous projections in toys intended for use by children aged 96 months or less. Hazardous projections shall not be exposed after the toy has been tested according to 5.4 through 5.10.

4.11.1. Protection of rigid projections—The toy shall be examined in all natural (unsupported) angles of repose. If a projection appears to constitute a potential puncture hazard, then the projection shall be protected by suitable means, such as by turning back the end of a wire, or by affixing a smoothly finished protective cap or cover which effectively increases the surface area for potential contact with the body.

4.12. Wheels, tires, and axles—These requirements are intended to eliminate the possibility of ingestion hazards (as described in 4.19) that might be caused by small wheels or tires that separate during normal use or reasonably foreseeable abuse, and laceration or puncture hazards from projecting axles, either on the toy or on wheel assemblies that may be removed from the toy during abuse. The requirements in table 2 shall apply to transportation wheels on both preassembled and knocked-down toys intended for children aged 96 months or less, except for ingestion hazards from small wheels and axles

which apply to toys intended for children aged 36 months or less, as covered in 4.19. In the case of knocked-down toys, the toy shall be tested in the form that it would be assembled by the purchaser, using simple household tools and/or special tools provided by the manufacturer, if any. The requirements do not apply to toys that are designed to be repeatedly assembled and taken apart, and are so described on the package, so that the purchaser expects to find removable wheel systems as part of the function of the toy (however, in no case shall the size requirement in 4.19.1 be disregarded). If the wheels, tires, or axles do not meet the requirements of table 2 (after being subjected to the use and abuse tests of 5.4 through 5.11), they shall not present a laceration, puncture, or ingestion hazard as defined in 3.16, 3.18, and 4.19.1, respectively.

4.13. Folding mechanisms and hinges—These requirements are intended to eliminate possible crushing, laceration, or pinching hazards that might occur in folding mechanisms and hinges used in toys capable of supporting the weight of a child. Examples are the sudden collapse or unexpected motion of a folding mechanism or hinge that produces a scissor action; and the changing clearances at the hinge line between two hinged portions, such that the gap will admit fingers at one position of the hinge but not at all positions. These requirements do not relate to the recognized and familiar hazards associated with the changing clearances around the edges of doors or pivoted or hinged sections in toy truck bodies, toy earth moving machinery, and similar toys not capable of supporting the weight of a child. Toys shall meet the requirements specified in 4.13.1 and 4.13.2 after the toys are tested according to 5.4 through 5.10.

4.13.1. Folding mechanisms—Toy furniture and other toys in which a folding mechanism, arm, or bracing is intended to support a child or comparable weight in normal use or reasonably foreseeable abuse shall have a safety stop or locking device to prevent unexpected or sudden movement or collapse of the article, or have adequate clearance to give protection for the fingers, hands, and toes against crushing or laceration in the event of sudden movement or collapse of the article.

4.13.2. Hinge line clearances—Toys having a gap or clearance along the hinge line between a stationary portion and a moveable portion that weighs more than ½ pound, shall be so constructed that, if the accessible gap at the hinge line will admit a 3/16-inch-diameter rod, it will also admit a ½-in-diameter rod at all positions of the hinge.

4.14. Holes, clearances, and protection of mechanisms—These requirements are intended to eliminate possible hazards that may be caused by changing clearances. Toys shall meet these requirements after the toys are tested according to 5.4 through 5.10. The different pinch clearance requirements in 4.14.1 through 4.14.6 reflect the different modes of entrapment or pinching that may be encountered.

4.14.1. Wheel clearances—This requirement concerns clearance between wheels and rigid wheel wells or fenders of ride-on toys, or the driven wheel(s) of toys powered by electrical, spring, or inertial energy. If such clearances admit a 3/16-inch-diameter rod, they shall also admit a ½-inch-diameter rod in order to prevent the trapping of fingers.

4.14.2. Circular holes in rigid materials—This requirement is intended to avoid finger entrapment (which may cut off blood circulation) in accessible holes in sheet metal and other rigid material in toys intended for children aged 60 months or less. (Noncircular holes are believed to present no significant hazard of cutting off blood circulation in entrapped fingers). If an accessible circular hole in any rigid material less than 0.062 inch in thickness can admit a ¼-inch-diameter rod to a depth of ⅜ inch or greater, it shall also admit a ½-inch-diameter rod.

4.14.3. Chains and belts—These requirements are to prevent finger crushing through entrapment between links of supporting chains or between chains and sprockets, or pulleys and belts.

4.14.3.1. Supporting chains—Chains in toys that support the weight of a child, such as hanging seats or similar indoor devices, intended for children 36 months or less in age shall be shielded if the chain is accessible and if a 3/16-inch-diameter rod can be inserted between two links, as in figure 8, with the chain in slack configuration.

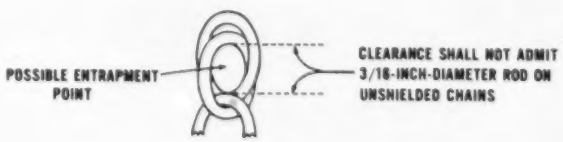


TABLE 2. *Wheel, tire, and axle requirements and tests*

Wheel, tire, or axle type	If the age of child for which toy is intended is (in months):	and if pulling wheel, tire, or axle off results in this hazard:	Then: Requirement is	Test is[b]
1. Tires affixed to wheels[a]	18 or less	Tire is ingestion hazard	Tires shall withstand a pull force of at least 10 pounds	5.11.1
		No ingestion hazard from tire	No pull-force requirement for tire; however, if tire cannot withstand a pull force of at least 10 pounds, and if remaining hub falls within the limits of an ingestion hazard, the hub shall meet the requirements specified in (2) or (3) below	
	Over 18, but not over 36	Tire is ingestion hazard	Tires shall withstand a pull force of at least 15 pounds	5.11.1
		No ingestion hazard from tire	No pull-force requirement for tire; however, if tire cannot withstand a pull force of at least 15 pounds, and if remaining hub falls within the limits of an ingestion hazard, the hub shall meet the requirements specified in (2) or (3) below	
	Over 36	Not applicable	None	None
2. Wheels free to rotate on axle (a) Wheels ¾ inch or less in diameter	18 or less	Ingestion, laceration, or puncture	Wheels shall withstand a pull force of 10 pounds	5.9
	Over 18, but not over 96	Laceration or puncture	Wheels shall withstand a pull force of 15 pounds	5.9
	Over 18, but not over 36	Ingestion		
(b) Wheels greater than ¾ in in diameter	Up to but not over 96	Laceration or puncture	Wheels shall withstand a pull force of 15 pounds	5.9
	Up to but not over 36	Ingestion		

See footnotes at end of table.

TABLE 2. *Wheel, tire, and axle requirements and tests*—Continued

Wheel, tire, or axle type	If the age of child for which toy is intended is (in months):	and if pulling wheel, tire, or axle off results in this hazard:	Then: Requirement is	Test is[b]
3. Wheels not free to rotate on axles				
(a) Wheels ¾ inch or less in diameter	18 or less	Ingestion, laceration, or puncture	Wheels shall withstand a torsional force of 3 inch-pounds, then a pull force of 10 pounds	5.8 then 5.9
	Over 18, but not over 36	Ingestion, laceration, or puncture	Wheels shall withstand a torsional force of 3 inch-pounds, then a pull force of 15 pounds	5.8 then 5.9
	Over 36, but not over 96	Laceration or puncture	Wheels shall withstand a torsional force of 4 inch-pounds, then a pull force of 15 pounds	5.8 then 5.9
(b) Wheels greater than ¾ inch in diameter	Up to but not over 96	Laceration or puncture	Wheels shall withstand a torsional force of 4 inch-pounds, then a pull force of 15 pounds	5.8 then 5.9
	Up to but not over 36	Ingestion		
4. "Snap-in" wheel and axle assembly				
(a) Capable of being grasped by child with at least the thumb and forefinger or teeth	Up to but not over 96	Not applicable	If axle can be removed by a 15-pound force when assembly is tested according to 5.11.2, there shall be no puncture hazard due to wheel which slides along axle	5.11.2 then 5.11.3
			If axle cannot be removed by a 15 pound force, then there are no requirements	5.11.2
(b) Not capable of being grasped by child with at least the thumb and forefinger or teeth	Up to but not over 96	Not applicable	If axle can be removed by a 10-pound force when assembly is tested according to 5.11.2, there shall be no puncture hazard due to wheel which slides along axle	5.11.2 then 5.11.3
			If axle cannot be removed by a 10-pound force, then there are no requirements	5.11.2

[a] Wheels to which tires are affixed shall also be tested in accordance with (2), (3), or (4) as appropriate.
[b] In addition to the tests listed below, the wheels, tires, or axles shall be subjected to all applicable use and abuse tests listed in 5.4 through 5.10 (for example, wheeled toys which could permit a child under the age of 36 months to insert a wheel into his mouth could be subjected to the bite test in 5.7).

4.14.3.2. Chains or belts for ride-on toys—Power transmission chains and belts in ride-on toys intended for children through the age of 120 months shall be shielded.[7]

4.14.4. Inaccessibility of mechanisms—Clockwork, battery-operated, inertial, or other power-driven mechanisms in toys intended for children of age 60 months or less shall be located or shielded so that a ¼-inch-diameter rod 3 inches long cannot contact parts of the mechanism that could present pinch or laceration hazards. Where mechanisms are located near openings having a minimum dimension over ¼ inch but not over 1 inch the following shall apply in addition to the above requirement: there shall be no pinch or laceration hazard in any direction within 1½ inches of the inside periphery of the opening (this requirement is intended to provide for certain cases where mechanisms might be contacted by a child's finger bent at a joint but not by a straight 3-inch rod). If an opening is in materials of such thickness that a child cannot bend his finger in the opening, this additional requirement shall not apply. (For circular holes, also see the requirement under 4.14.2.)

4.14.5. Winding keys—This requirement is to avoid pinching or laceration of fingers by entrapment between the key and the body of the toy. It applies to toys intended for children aged 36 months or less that use winding keys which rotate as the mechanism unwinds. This requirement applies to keys with flat plates attached to the stem, and which protrude from a rigid surface; the requirement does not apply to those circular knobs to which the torque is applied. If the clearance between the flukes of the key and the body of the toy will admit a ¼-inch diameter rod, it shall also admit a ½-inch diameter rod at all positions of the key. For keys covered by this requirement, there shall be no opening in the flukes of the key which can admit a 3/16-inch-diameter rod.

4.14.6. Coil springs—These requirements are intended to prevent the pinching or crushing of fingers or toes by toys containing springs. Coil springs (either compression or extension) that form part of a component that carries the weight of a child shall be shielded so as to prevent access during use or reasonably foreseeable abuse unless:

(a) a ⅛-inch-diameter rod cannot be freely inserted, or

(b) a ¼-inch-diameter rod can be freely inserted,

between the adjacent coils at all points in the action cycle[8] when the spring is subjected first to a weight of 3 pounds and then to a weight of 70 pounds.

4.15. Stability of ride-on toys and seats—These requirements are intended to minimize unexpected hazards that could be caused by a toy that can easily tip. It takes into account the use of the child's legs as stabilizing means, and recognizes that a child instinctively leans to compensate for inclined positions. The requirements in 4.15.1 and 4.15.2 shall apply to the following classes of toys intended for use by children aged 60 months or less: ride-on toys with three or more load bearing wheels, such as tricycles and wagons; ride-on action type toys such as hobby horses; and stationary toys with seats, such as play furniture. Ride-on toys of spherical, cylindrical, or other shape which do not normally have a stable base are not covered by these requirements. Toys with seats less than 12 inches vertically above the ground shall be excluded from the stability test if the feet are not restrained by an enclosing structure. The toy shall conform to these requirements after the toy is tested according to 5.4 through 5.10.

4.15.1. Sideways stability requirement—These requirements recognize two types of possible stability hazards: those associated with ride-on toys or seats where the feet can provide stabilization, and those situations where the feet are restricted by an enclosing structure.

4.15.1.1. Sideways stability, feet available for stabilization—There shall be no sideways stability test for those ride-on toys or seats in which the height of the seat from the ground is one-third, or less than one-third, of the height shown in table 3 at the lowest age of the age range for which the ride-on toy or seat is intended, and where the legs of the child are unrestricted in their sideways motion and thus are available for stabilization. (The values shown in table 3 represent the lower of the following two numbers: (1)

[7] This subjective requirement will be replaced by a requirement based on any requirements for protective guards covering bicycle chains promulgated by the Consumer Product Safety Commission (CPSC). Proposed regulations were published in the *Federal Register* on January 7 1975, (pages 1493–1495). An amendment to this Standard containing requirements on guards for chains and belts will be initiated in the event that CPSC publishes mandatory requirements for protective guards.

[8] The action cycle refers to the following sequence: spring at rest, the action of the spring when loaded the action of the spring when unloaded, and finally the action of the spring which occurs before it comes to rest again.

the 10th percentile group according to appendix A of boys at each age from 2 up to and including 5 years, and (2) the 10th percentile group according to appendix A of girls at each age from 2 up to and including 5 years). For those ride-on toys or seats in which the height of the seat from the ground is greater than one-third of the height shown in table 3 at the lowest age of the age range for which the ride-on toy or seat is intended, and where the legs of the child are unrestricted in their sideways motion and thus are available for stabilization, the toy shall not tip when tested as follows:

(a) Place the toy across the slope of a smooth surface inclined 10° to the horizontal.

(b) Turn the steering mechanism, if any, to a position where the toy is most likely to tip.

(c) Chock wheels to restrict rolling but allow casters to assume their natural position before chocks are applied.

(d) Apply to the seat a static load equal to the weight shown in table 4 at the highest age of the age range for which the toy is intended. (The values shown in table 4 represent the greater of the following two numbers: (1) the 97th percentile group according to appendix A of boys at each age from 2 up to and including 5 years, and (2) the 97th percentile group according to appendix A of girls at each age from 2 up to and including 5 years). The load shall be applied so that its center of gravity lies in the true vertical 6 inches above the center of the seat [while the toy is on the 10° incline as specified in 4.15.1.1. (a)]. In the case of wagons the load is to be applied on the rearmost one-third of the wagon bed.

4.15.1.2. Sideways stability, feet unavailable for stabilization—If the sideways motion of the feet and/or legs is restricted, such as by the enclosed sides of a toy automobile, then the ride-on toy or seat shall not tip when tested as specified in 4.15.1.1; except that the surface shall be inclined 15° to the horizontal.

4.15.2. Fore and aft stability—This requirement relates to the stability of the ride-on toy or seat in the front and back direction with respect to the rider, so that the rider cannot easily use the legs for stabilization. All ride-on toys or seats falling within the scope of 4.15 shall not tip forward or backward when the toy, which shall be loaded with a simulated child's weight, is tested both facing down and up the slope using the test method specified in 4.15.1.1, except that the surface shall be inclined 15° to the horizontal. The load shall be applied in the least favorable position on the seat for each direction.

4.16. Overload requirements for ride-on toys and seats—This requirement is intended to minimize unexpected hazards that could be caused by a toy that is not capable of accepting an overload. All ride-on toys, toys intended for use as seats, or toys designed to support all or part of the weight of a child shall support a load applied to the seat, or to other such intended load-bearing components, without collapsing to produce a hazardous condition. (Examples of hazardous conditions if collapse occurs would include: exposure of hazardous edges or points, projections, crushing or pinching hazards, and power-driven mechanisms). This load shall be three times the weight shown in table 4 at the highest age of the age range for which the toy is intended. The toy shall conform to this requirement after being tested according to 5.4 through 5.10.

TABLE 4. *Weight of 97th percentile children (adapted from appendix A by taking value of 97th percentile boys or 97th percentile girls, whichever is higher*

Age (in years)	Weight (in pounds)
2	35
3	42
4	49
5	53
6	57
7	66
8	77
9	90
10	101
11	115
12	128
13	143
14*	157

* The weight of a 97th percentile 14-year old is not available from the charts in appendix A. For purposes of this standard, the weight of a 97th percentile 14-year old is 14 pounds more than the weight of a 97th percentile 13-year old. The figure of 14 pounds is the average of the three previous increases in the table.

4.17. Tipping of stationary floor toys—This requirement is intended to minimize hazards that might be caused by a toy that tips when a door, drawer, or other movable portion is extended to its fullest travel. Stationary floor toys of greater than 30 inches in height and weighing more than 10 pounds shall not tip when placed on a 10° incline with all movable portions extended to their fullest travel and facing in the direction of the downslope side. The toy shall conform to this requirement after it is tested according to 5.4 through 5.10.

4.18 Confined spaces[9]—The purpose of these requirements is to minimize the possible entrapment of children in toys that form enclosures, such as toy storage chests or toy refrigerators, and to avoid possible suffocation in head-enclosing toys such as space helmets. Toys shall meet the requirements in 4.18.1 through 4.18.3 after the toys are tested according to 5.4 through 5.10.

4.18.1 Ventilation[9]—Any toy having a door or lid, which encloses a continuous volume greater than 1.1 cubic feet, and in which all internal dimensions are 6 inches or more, shall provide an unobstructed ventilation area of greater than a total of 2 square inches over 2 or more separate openings situated at least 6 inches apart when the toy is placed on the floor in any position and adjacent to two vertical plane surfaces meeting at a 90° angle, so as to simulate the corner of a room. If a permanent partition or bars (two or more) which effectively limit the continuous space by making the smallest internal dimension less than 6 inches are used to subdivide a continuous space, the ventilation area shall not be required.

4.18.2. Closures[9]—Closures (such as lids, covers, and doors) to enclosures falling within the scope of 4.18.1 shall not be fitted with automatic locking devices. Closures shall be of a type which can be opened with a force of 10 pounds or less when tested as follows:

With the closure in a closed position, apply the force in an outward direction to the inside of the closure perpendicular to the plane of the closure and anywhere within 1 inch from the geometric center of the closure. The force measurements shall be made by means of a force gage with a calibrated accuracy within ± 0.3 pound when measuring a force of 10 pounds. The dial of the gage shall be graduated with its finest division not exceeding 0.2 pound, and the full scale range shall not exceed 30 pounds.

4.18.3. Toys that enclose the head—Toys that enclose the head, such as space helmets, which are made of impermeable materials shall provide means for breathing by the incorporation of two unobstructed ventilation areas, each of which is at least 1 square inch, situated at least 6 inches apart.

4.19. Small objects[10]—These requirements are intended to minimize hazards from ingestion or inhalation of small objects, such as small toys, components of toys, or pieces that break off or are removed from toys. The toy shall conform to the requirements of 4.19.1 through 4.19.3 after testing according to 5.4 through 5.10.

4.19.1. Size—Toys, removable or liberated components, or fragments of toys intended for use by children aged 36 months or less shall be of such a size while in an uncompressed state that they will not fit within the limits of a truncated right cylinder as shown in figure 9. Highly porous materials, such as cheesecloth, string, and pompoms, are exempt from this requirement.

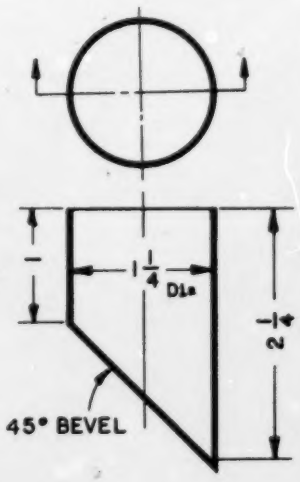


FIGURE 9. *Truncated right cylinder.*
(Dimensions in inches)

4.19.2. Removal of parts—Eyes, squeakers, knobs, or other components which are on toys intended for children aged 36 months or less and

[9] The Consumer Product Safety Commission proposed regulations on ventilation and closures for Toy Chests and Similar Children's Articles in the *Federal Register* on April 27, 1973. Any mandatory regulations issued by the Commission will supersede the ventilation and closures requirements in this Standard.

[10] The Consumer Product Safety Commission proposed regulations on hazards due to small parts in the *Federal Register* on January 22, 1973. Any mandatory regulations issued by the Commission will supersede the small objects requirements in this Standard.

which can fit within the length of the truncated right cylinder described in 4.19.1 shall either be so attached that they cannot be gripped by at least the thumb and forefinger or the teeth or shall not be removed when subjected to the appropriate use and abuse tests described in section 5. For special requirements for certain kinds of wheels, see 4.12.

4.19.3. Mouth-actuated toys—This requirement relates to toys such as noisemakers that are intended to be repeatedly actuated by blowing or sucking, and does not apply to certain types of inflatable toys which are intended for continuous use in the inflated form. Mouth-actuated toys that contain loose objects, such as spheres in a whistle, or inserts, such as reeds in a noisemaker, shall not release an object which will fit within a truncated right cylinder as shown in figure 9 when air is alternately blown and sucked rapidly through the mouthpiece, according to the procedure described in 5.13. If the air outlet is capable of being inserted into or covered by the mouth, then the procedure of 5.13 shall also be applied to the outlet.

4.20. Simulated protective devices, such as helmets, hats, and goggles—These requirements are intended to minimize hazards that might be caused. for example, by goggles or space helmets if the material from which they are constructed fails; or by toys that simulate protective devices, such as football helmets and pads, if the wearer uses the article as a real protective device rather than as a toy. The toy shall conform to the requirements in 4.20.1 through 4.20.3 after testing according to 5.4 through 5.10.

4.20.1. Eye protection—Toys that cover the face, such as goggles, space helmets, or face shields, shall be constructed of impact resistant material that will not fail under normal use or reasonably foreseeable abuse so as to generate sharp edges, points, or small pieces that could enter the eye. Toys shall be tested for compliance according to 5.14. Nonrigid costume masks are exempt from this requirement.

4.20.2. Interior finish—The interiors of toys that cover the face shall be free of hazardous edges, points, and projections.

4.20.3. Simulated protective devices—Toys that simulate safety protective devices, such as football helmets and pads and baseball caps, shall be clearly marked in accordance with 4.22.1.1 to warn the purchaser that they are not safety protective devices. Also, the packages in which these toys come shall be marked in accordance with 4.22.1.1. The marking on the toy shall withstand normal use, and reasonably foreseeable abuse, and shall be of the same size as required for the package.

4.21. Projectiles—These requirements relate to certain, but not all, potential unexpected hazards that might be caused by projectiles and by the firing of improvised projectiles. Certain well-recognized hazards that are inherent in such traditional toys as slingshots and darts are not covered by this requirement. The discharge mechanism as well as the projectile shall conform to the requirements in 4.21.1 and 4.21.2 after testing according to 5.4 through 5.10.

4.21.1. The integrity of protective tips—Protective tips of projectiles shall withstand the torque and tension tests in 5.8 and 5.9, and shall not produce or reveal hazardous points or edges when fired into a solid object, according to the test procedures described in 5.6.5.

4.21.2. Discharge mechanisms — Discharge mechanisms shall be unable to discharge hazardous improvised projectiles such as pencils or pebbles without modification by the user.

4.22. Labeling, literature, and marking

4.22.1 Federal Government requirements[11] —Toys falling within the requirements of the Federal Hazardous Substances Act shall conform to the labeling requirements of Title 16, Code of Federal Regulations, Section 1500.83, or to subsequent regulations issued under the Act. Examples are chemistry sets, Section 1500.83 (a) 23, and toys containing mineral oil, Section 1500.83 (a) 32.

4.22.1.1 Toys requiring cautionary labeling —Certain toys or packages are required to carry cautionary labeling in order to comply with this Standard. The packages of the toys falling within the requriements of 4.9, 4.9.1, 4.10.2, 4.20.3, and 4.22.2.1, shall be labeled with the word "caution" and a statement of the hazard on the principal display panel. In addition, the toys falling under the requirements of 4.20.3 and 4.22.2.1 shall themselves be labeled with the word "caution" and a statement of the hazard. The principal display panel is defined as that part of a package which is most likely to be displayed, presented, shown, or examined under normal and customary conditions of display for retail sale. The label shall

[11] There are also numerous State and local government requirements that must be considered. Requirements for Federal preemption of State and local labeling is given in Section 1500.7 of Part 1500 of Title 16, Code of Federal Regulations. Mandatory labeling requirements for electrically operated toys are given in Section 1505.3 of Title 16, Code of Federal Regulations.

be printed in a contrasting color and shall be distinctively apart from other wording or designs. The word "caution" on both package and product shall be clearly legible and discernible and in capital letters; each of the capital letters shall be not less than 3/16-inch high. The statement describing the hazard shall be in letters not less than 1/16-inch high. In the case of a toy item packed as a premium in or on a package containing other items, any cautionary statements shall be part of the statement describing the toy, and the cautionary statements shall be on the toy package rather than on the larger package (for example, cereal package).

4.22.2 **Flotation toys**—A hazard that needs to be considered is the possible assumption that flotation toys are lifesaving devices. The requirement in 4.22.2.1 applies to toys designed for water recreational use, as distinct from flotation toys used in the bathtub, but excludes boats designed for children to ride in.

4.22.2.1. **Labeling requirement** — Flotation toys designed for recreational use and their packages shall be clearly labeled in accordance with 4.22.1.1 so that the purchaser is informed that they are not lifesaving devices and that they should be used in water only under parental supervision. The labeling or marking on the toy shall read "Caution, this is not a lifesaving device," and shall resist normal use and reasonably foreseeable abuse, and shall conform to the same size requirements as that for the package. No advertising copy or graphics shall imply that the child will be safe with such a toy if left unsupervised.

4.22.3. **Age grading**—Toy packages containing toys which are affected by or subject to any of the requirements of this Standard shall be labeled to indicate the minimum age for intended use. If the toy or toy package is not age labeled in a clear and conspicuous manner or, based on such factors as marketing practices and the customary patterns of usage of the toy by children, is inappropriately age labeled, the toy shall be subjected to the most stringent applicable requirements within this Standard (two examples: (1) a tensile force of 15 pounds shall be required instead of 10 pounds, in the case of 5.9 if no maximum age of intended use is specified; (2) the "highest age of the age range" in 4.16 would be 14 years, the maximum age addressed in the Scope of the Standard).

4.22.4. **Deceptive use of promotional statements and other materials**—Packages, literature, and point-of-sale presentations shall not use words, statements, or other graphic material that is inconsistent in any way with cautionary labeling, age grading, or instructions for use of the toy.

4.22.5. **Instructional literature** — Information and instructions provided with the toy, whether on the package or in leaflet form, shall be easy to read and understand by persons of the age level for which the instructions were intended.

4.22.6. **Producers markings**—Either a principal component of a toy or the package of a toy shall be marked with the name and address of the producer or distributor. In the case of toys sold in bulk, such as jacks or marbles, only the container need be marked. All of these markings shall be legible and so positioned as to be easily seen by the customer, and shall resist normal use conditions. Toys may carry a code which will enable the producer to identify model changes except for toys comprising many loose components, in which case the container may be so coded.

5. INSPECTION AND TEST PROCEDURES

5.1. **General**—The inspection and test procedures contained herein are to be used to determine the conformance of products to the requirements of this Voluntary Product Standard. All types of toys covered by this Standard must undergo the normal use and abuse tests as outlined in 5.4 through 5.10. The remaining tests in section 5 apply to types of toys as specified within the requirements of section 4. The relevant tests for a type of toy can be done in any order. All toys shall be preconditioned according to 5.3 prior to testing. Each test may be conducted on a different toy unless otherwise specified. The tests can be considered as qualification tests and not necessarily as quality control tests. These tests shall also be conducted when there is a design or material change in the toy. Each producer or distributor who represents his products as conforming to this Standard may utilize statistically based sampling plans which are appropriate, but shall keep such essential records as are necessary to document with a high degree of assurance his claim that all of the requirements of this Standard have been met. Any test methods which are made mandatory by the Consumer Product Safety Commission shall supersede any applicable test methods in section 5.

5.2. **Testing for hazardous substance content**—The applicable sections of Title 16, Code of Federal Regulations, issued under the Federal Hazardous Substances Act to be used in determining the presence of hazardous substances are given in table 5. The references in table 5 refer to the Regulations issued on September 27, 1973.

TABLE 5. *Determination of hazardous substance content*

Hazardous substance	Test method
Toxic substance	1500.3(b)5, 1500.3(c)2 and 1500.40
Corrosive substance	1500.3(b)7, 1500.3(c)3 and 1500.41
Irritant substance	1500.3(b)8, 1500.3(c)4, 1500.41 and 1500.42
Strong sensitizer	1500.3(b)9, 1500.3(c)5, and 1500.13
Pressure generating substance	1500.3(c)7
Radioactive substance	1500.3(b)11 and 1500.3(c)8

The latest issue of the Regulations shall be used to determine compliance of the toy with the requirements of this Standard. The requirements of the Federal Hazardous Substances Act are mandatory by law.

5.3. Preconditioning of toys to simulate shipping and storage—This procedure, which is designed to simulate temperature changes that can be encountered in shipment and storage of toys or components, shall be used prior to the tests described in 5.4 through 5.14. Toys made entirely from textile fibers and flexible foams and combinations thereof or metal shall be exempt from this requirement. The toy shall be left in a cold cabinet at 0 ± 5 °F for at least 4 hours, shall then be equilibrated to room temperature, transferred to an oven at 130 ± 5 °F for at least 4 hours, and again equilibrated to room temperature. This process shall be repeated for a second cycle. Toys shall be preconditioned in the state of assembly in which they are shipped, but shall not be preconditioned in the shipping container or packing. Under referee conditions, "equilibrated to room temperature" shall mean subjecting the toy to a temperature of 73 ± 3 °F at a relative humidity of 20 to 70 percent for a minimum of 4 hours. Any relevant test of an individual toy shall commence within 5 minutes after the toy has been removed from the preconditioning atmosphere.

5.4. Normal use testing—These tests are intended to simulate normal use conditions so as to assure that hazards are not generated through normal wear and deterioration. The object of these tests shall be to simulate the normal play mode of the toy, and the tests are, therefore, unrelated to the reasonably foreseeable abuse tests of 5.5 through 5.14. The tests are intended to uncover hazards, rather than to demonstrate the reliability of the toy. The fact that a mechanism or material of a toy fails during testing is only relevant if the failure creates a potential hazard. Toys preconditioned in accordance with 5.3 shall be subjected to appropriate tests to simulate the expected mode of use of the particular toy. For example, levers, wheels, catches, triggers, strings, wires, chains, and so on, that are intended to be actuated by a child shall be repeatedly operated.[12] Spring or power-operated devices shall be similarly tested. The tests shall be carried out in an expected use environment. For example, toys intended for use in the bathtub shall be tested in soapy water, and toys intended for use in the sandbox shall be exposed to sand during testing. It is recognized that no specific requirements are defined here; it would not be possible in view of the wide range of toys covered by this Standard. However, the manufacturer or distributor must do enough testing to satisfy himself that normal use during the estimated lifetime of the toy is being simulated. The toy shall be inspected after such tests, and hazards such as points, sharp edges, and release of small parts shall be evaluated according to the relevant requirements under section 4.

5.4.1. Washable toys—Toys described as "machine washable" on the toy, package, or instructions shall be subjected to six machine washing and tumble drying cycles, as described in 5.4.1.1, unless a different drying method is specified by the toy manufacturer by means of a permanent label. They shall then be inspected for compliance with this standard.

5.4.1.1. Conditions for machine washing and tumble drying—The washing procedure shall be in accordance with the American Association of Textile Chemists and Colorists (AATCC) Test Method 135-1973, *Dimensional Changes in Automatic Home Laundering of Durable Press Woven or Knit Fabrics* in AATCC publication, *Technical Manual of the American Association of Textile Chemists and Colorists*. The toy, plus a dummy load of cloths sufficient to bring the total dry weight to 4 pounds, is washed in an automatic washing machine, using a 12-minute cycle at

[12] It is recognised that "repeatedly operated" is subjective. Good Housekeeping Institute has put together and used a table (shown below) of required actuation or cycles based on the time necessary to complete an individual cycle. The user of this Standard may want to use this table for normal use testing of toys containing mechanisms, motors, gear trains, linkages, levers, knobs, keys, locks or switches which are battery or hand operated or in which actuation is initiated or sustained by human effort.

Cycle or actuation time can be established with a stopwatch. From the table below, the user can select the required number of times the sample must be cycled. This number of actuations should be performed in a fashion that will closely simulate the normal use of the toy.

Classification	Time to complete cycle or actuation	Required actuation or cycles
Slow	more than one minute	50
Moderate	15 seconds to one minute	100
Fast	3 seconds to 15 seconds	200
Very fast	less than 3 seconds	500

"Normal" setting under Machine Wash Condition III of the AATCC Test Method. The toy and dummy load shall then be tumble dried in an automatic clothes dryer, at the "Normal" setting under Tumble Dry Condition B of the AATCC Test Method, operating the dryer until the load is dry.

5.5. Abuse testing—The tests described in 5.6 through 5.14 are to simulate the exposure of a toy to mechanical damage through dropping, throwing, and other actions likely to be performed by a child, which are characterized as reasonably foreseeable abuse. After testing, the toy shall be examined for mechanical hazards, such as hazardous sharp edges and points, and ingestion hazards, such as small liberated components, chips, or fragments according to the particular age grading requirement for each hazard, as described in section 4. Toys shall be preconditioned prior to testing for reasonably foreseeable abuse in accordance with the requirements of section 5.3. Toys reasonably intended to be assembled by an adult and not intended to be taken apart by a child shall be tested only in the assembled or reassembled state if the shelf package and the assembly instructions prominently indicate that the article is to be assembled only by an adult. Individual parts of toys that are intended to be assembled by children shall be tested as well as the fully assembled toy; however, the assembled toy shall be made of components which have not been subjected to the abuse testing.

5.6. Impact tests—These tests are intended to simulate situations in which possible damage can occur to a toy by reason of it falling from a crib, a table or counter top, or other impact situations which may occur as a result of reasonably foreseeable abuse. After undergoing the appropriate test, the toy shall be examined for possible hazards, such as points, edges, or ingestible objects, in accordance with the relevant requirement of section 4.

5.6.1. Drop test, toys for children aged 18 months or less—Except for the toys covered under 5.6.4.1, toys having a weight of less than 3 ± 0.01 pounds shall be subject to this test. The toy shall be dropped 10 times from a height of 4.5 feet (± 0.5 inch) onto an impact area. The toy shall be dropped in random orientation. After each drop, the test sample shall be allowed to come to rest and shall be examined and evaluated before continuing. The impact medium shall consist of a 1/8-inch nominal thickness of type IV vinyl-asbestos tile, as specified in Federal Specification SS-T-312A over at least a 2.5-inch thickness of concrete. The impact area shall be at least 3 square feet.

5.6.2. Drop test, toys for children aged over 18 but not over 36 months—Except for the toys covered under 5.6.4.1, toys having a weight of less than 4 ± 0.01 pounds shall be subject to this test. The toy shall be dropped four times from a height of 3 feet ± 0.5 inch onto the impact medium described in 5.6.1. The toy shall be dropped in random orientation. After each drop, the test sample shall be allowed to come to rest and shall be examined and evaluated before continuing.

5.6.3. Drop test, toys for children aged over 36 but not over 96 months—Except for the toys covered under 5.6.4.1., toys having a weight of less than 10 ± 0.01 pounds shall be subject to this test. The toy shall be dropped four times from a height of 3 feet ± 0.5 inch onto the impact medium described under 5.6.1. The toy shall be dropped in random orientation. After each drop, the test sample shall be allowed to come to rest and shall be examined and evaluated before continuing.

5.6.4. Impact test for toys exempt from drop tests—

5.6.4.1. Tipover test for large bulky toys—A toy that has (1) a projected base area of 400 or more square inches, and/or (2) a volume of more than 3 cubic feet calculated by the major dimensions without regard to minor appendages, shall be tested for impact by tipping it over three times by pushing the sample slowly past its center of balance onto the impact medium described in 5.6.1. The base area for toys having permanently attached legs shall be measured by calculating the area enclosed by straight lines connecting the outermost edge of each leg of the perimeter.

5.6.5. Impact test for projectiles—Projectiles, as defined in 3.17, shall be propelled by their discharge mechanism three times into a concrete block wall (or equivalent surface) located at a distance 1 foot plus the length of the projectile from the front end of the launcher. The discharge mechanism shall be aimed perpendicular to the wall.

5.6.6. Tumble test for wheeled toys—Wheeled toys weighing more than 3 pounds but not more than 10 pounds shall be tumbled down a flight of 6 steps with risers not less than 7 inches high (see fig. 10). The treads may be wood, cement, or metal. The toy shall be caused to fall down the steps two times in each of four attitudes: tumbling forwardly end-over-end, and tumbling rearwardly end-over-end from each side. The toy shall be pushed slowly over the edge of the top step in the appropriate attitude, and re-

leased as soon as it begins to fall of its own weight. The test shall be considered complete for an attitude even if the toy does not reach the bottom of the flight of steps.

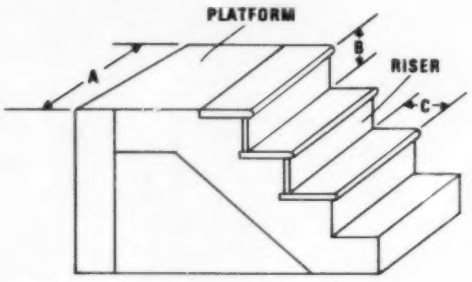


FIGURE 10. *Illustration of step construction.*

5.7. Bite test—Any toy (or component or any accessible portion thereof) intended for children under the age of 36 months that has an external dimension of 1.25 inches ± 0.05 inch or less and a design configuration that would permit a child to insert a portion into the mouth in any orientation up to a biting thickness of 1.25 inches ± 0.05 inch, for a penetration of at least 0.25 inch, shall be subjected to this bite test. The test load used in the bite test shall be 25 pounds in the case of toys intended for use by children 18 month or less in age and 50 pounds in the case of toys intended for use by children over 18 but not over 36 months of age. The test article shall be placed in the contact mechanism in any reasonable position for a penetration of 0.25 to 0.5 inch, which position utilizes less than 180° of the arc of the contact mechanism, and the test load within ± 0.5 pound shall be evenly applied within 5 seconds. This load shall be maintained for an additional 10 seconds. The contact mechanism shall be two metal strips or plates, each measuring 0.25 ± 0.002 inch high and each having a contact edge radius of 0.020 ± 0.002 inch for at least a 150° cross-sectional arc.[13] The loading device shall be a scale or force gage having an accuracy of ± 0.5 pound.

5.8. Torque tests for removal of components—Any toy with a projection, part, or assembly that a child can grasp with at least the thumb and forefinger or the teeth shall be subject to this torque test. The torque required to simulate the normal and reasonably foreseeable abuse of the toy shall be as follows (with a tolerance of ± 0.2 inch-pound):

2 inch-pounds — toys intended for use by children 18 months in age or less
3 inch-pounds — toys intended for use by children over 18 but not over 36 months of age
4 inch-pounds — toys intended for use by children over 36 but not over 96 months of age

The loading device used in the test shall be a torque gauge, torque wrench, or other appropriate device having an accuracy of ± 0.2 inch-pound. A clamp capable of holding the test component firmly and transmitting a torsional force shall be used. With the toy rigidly fastened in any reasonable test position, the clamp is fastened to the test object or component. The torque shall be applied evenly within a period of 5 seconds in a clockwise direction until either (1) a rotation of 180° from the original position has been attained or (2) the required torque is extended. The maximum rotation or required torque shall be maintained for an additional 10 seconds. The torque shall then be removed and the test component permitted to return to a relaxed condition. This procedure shall then be repeated in a counterclockwise direction.

5.8.1. Toys with rotating components—Projections, parts, or assemblies that are rigidly mounted on an accessible rod or shaft designed to rotate along with the projections, parts, or assemblies shall be tested in accordance with 5.8 with the rod or shaft clamped to prevent rotation.

5.9. Tension test for removal of components—Any projection of a toy that the child can grasp with at least the thumb and forefinger or the teeth shall be subject to this test. This test shall be conducted on the same toy that has been subjected to the torque test described in paragraph 5.8. The tension required to simulate the normal and reasonably foreseeable abuse of the toy shall be as follows (with a tolerance of ± 0.5 pound):

10 pounds — toys intended for use by children 18 months in age or less
15 pounds — toys intended for use by children over 18 but not over 36 months of age
15 pounds — toys intended for use by children over 36 but not over 96 months of age

[13] Information on a contact mechanism which could be used for the bite test is available from the Office of the Secretary, Consumer Product Safety Commission, 1750 K Street, NW., Washington, D.C. 20207.

A clamp capable of applying a tension load to the test component shall be used. The loading device shall be a self-indicating gage or other appropriate means having an accuracy of ± 0.5 pound. With the test sample fastened in a convenient position, an appropriate clamp shall be attached to the test object or component. The required tensile force shall be evenly applied, within a period of 5 seconds, parallel to the major axis of the test component and maintained for an additional 10 seconds. The tension clamp shall then be removed and a second clamp suitable for applying a tension load perpendicularly to the major axis of the test component shall be attached to the test object or component. The required tensile force shall be evenly applied, within a period of 5 seconds, perpendicularly to the major axis of the test component and maintained for an additional 10 seconds.

5.9.1. Tension test on stuffed toys and beanbags—A stuffed toy or beanbag constructed of pliable materials having seams (such as fabrics) shall have the seams subjected to the force required in 5.9 applied in any direction.

5.10. Compression test—Any area on the surface of a toy that is accessible to a child and inaccessible to flat-surface contact during the impact test shall be subject to this test. The compression required to simulate the normal and reasonably foreseeable abuse of the toy shall be as follows (with a tolerance of ± 0.5 pound):

20 pounds — toys intended for use by children 18 months in age or less
25 pounds — toys intended for use by children over 18 but not over 36 months of age
30 pounds — toys intended for use by children over 36 but not over 96 months of age

The loading device shall be a rigid metal disk 11.25 ± 0.015 inch in diameter and 0.375 inch in thickness. The perimeter of the disk shall be rounded to a radius of 1/32 inch to eliminate irregular edges. The disk shall be attached to an appropriate compression scale having an accuracy of ± 0.5 pound. The disk shall be positioned so that the contact surface is parallel to the surface under test. The required force shall be evenly applied within 5 seconds through the disk. This load shall be maintained for an additional 10 seconds. During the test the toy is to rest on a flat, hard surface in any convenient position.

5.11. Tests for tire removal and snap-in wheel and axle assemblies removal—These tests relate to the requirements of 4.12.

5.11.1 Removal of tires—The toy shall be clamped so that the wheel axle is vertical. A wire hook shaped as shown in figure 11 shall be positioned on the lower tire and attached to a dead weight of 10 ±0.5 pounds if the tire is on a toy intended for children aged 18 months or less, or to a dead weight of 15 ± 0.5 pounds if the tire is on a toy intended for children aged over 18 months but not over 36 months. The load shall be applied gradually over a period of 5 seconds and maintained for 10 seconds.

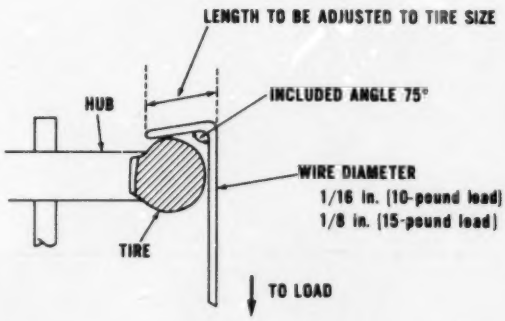


FIGURE 11. *Hook for tire removal.*

5.11.2. Toys assembled with "snap-in" axles—A 15 ± 0.5 pound dead weight shall be applied perpendicularly to the axle and in the least favorable direction, adjacent to a bearing (but between the two bearings), for 10 seconds, using a hook and string for attachment to the toy. The toy shall be held horizontally in a test-convenient fixture, and the load shall be applied gradually over a 5-second period and then shall be maintained for 10 seconds. If the axle cannot be hooked as described above, the toy shall be held horizontally, and a 10 ± 0.5 pound dead weight shall be attached to one wheel by means of a hook or clamp that acts perpendicular to the axle in the least favorable direction. The load shall be applied gradually over a 5-second period and then be maintained for 10 seconds.

5.11.3. Compression test for "snap-in" wheel and axle assemblies—This test is for determining compliance to 4.12 if the axle and wheel is removed by the procedure described in 5.11.2. The wheel and axle assembly shall be positioned with the axle vertical over a hole in a rigid plate, as shown in figure 12. The hole shall be large enough in diameter to permit the axle to pass through. A load of 20 ± 0.5 pounds is applied to the upper wheel, using a suitable circular adaptor to prevent interference with the axle. The load shall be ap-

plied gradually over a 5-second period and then shall be maintained for 10 seconds. When applying the load the upper wheel shall be guided, if necessary, in order to maintain the axle in a verticle position but shall not be restrained from moving downward. In those cases where the axle is forced through either wheel, the axle shall not form a hazardous point or projection.

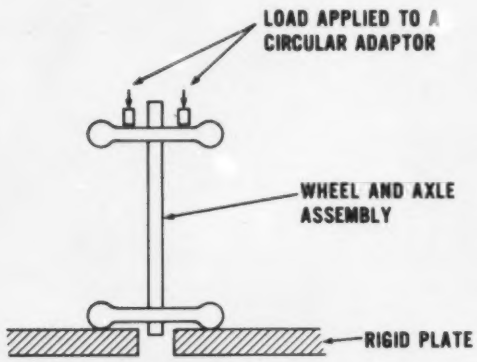


FIGURE 12. *Compression test for wheel assemblies.*

5.12. Flexure test—This test is for determining compliance to 4.10.4, *Wires or rods used as flexible skeletons.* The toy shall be secured in a vise equipped with vise shields that are fabricated from 13-gage thick cold-rolled steel or other similar material and that have a 0.375-inch inside radius as shown in figure 13. The component shall then be bent through a 60° arc by a force applied perpendicularly to the major axis of the component at a point 2 ± 0.05 inches from the intersection of the component with the main body of the toy or applied at the end of the component if the component is less than 2 inches long. The component shall then be bent in the reverse direction through a 120° arc. This process shall be repeated for 30 cycles at a rate of one cycle per 2 seconds with a 60-second rest period occurring after each 10 cycles. Two 120° arc bends shall constitute one cycle.

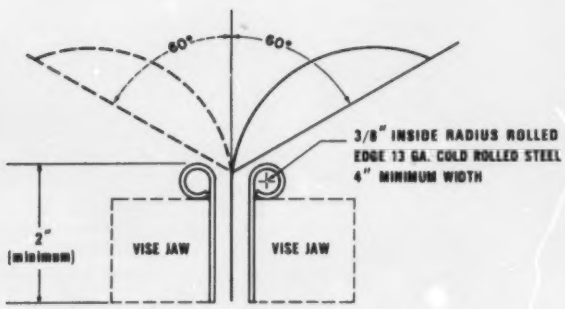


FIGURE 13. *Vise shields for bending test.*

5.13. Test for mouth actuated toys—A piston pump capable of discharging and taking in more than 18 cubic inches of air in less than 3 seconds shall be connected to the mouthpiece of the toy. A relief valve shall be so arranged that the pump will not generate a positive or negative pressure of more than 2 psig. The toy shall be subjected to 10 alternating blowing and sucking cycles of at least 18 cubic inches of air, including that volume which may be discharged through the relief valve. Any objects released as a result of this test shall be inspected for conformance with 4.19.1. If the air outlet of the toy is accessible as described in 4.19.3, then the above procedure shall also be applied to the outlet.

5.14. Impact test for toys that cover the face—The toy shall be held firmly in a suitable clamp with that portion covering the eyes in a horizontal plane. Drop a 5/8-inch-diameter steel ball weighing 0.56 ounce (with a tolerance of + 0.03, — 0 ounce) from a height of 50 inches upon the horizontal upper surface of the toy in the area that would cover the eyes in normal use. The ball may be guided, but not restricted, in its fall by being dropped through a perforated tube extending to within approximately 4 inches of the toy. The toy will be considered to have failed if the material cracks through its entire thickness or if any material visible to the naked eye becomes detached.

6. IDENTIFICATION

In order that purchasers may identify products conforming to all requirements of this Voluntary Product Standard, producers, importers, and distributors may include a statement of compliance in conjunction with their name and address on product labels, invoices, sales literature, and the like. The following statement is suggested when sufficient space is available:

This toy conforms to all of the requirements established in Voluntary Product Standard PS 72-76, (a safety standard), developed cooperatively with the industry and published by the National Bureau of Standards under the *Procedures for the Development of Voluntary Product Standards* of the U.S. Department of

Commerce. Full responsibility for the conformance of this product to the Standard is assumed by (name and address of producer, importer, or distributor).

The following abbreviated statement is suggested when available space on labels is insufficient for the full statement:

Conforms to safety requirements of PS 72-76, (Name and address of producer, importer, or distributor).

7. EFFECTIVE DATE

The effective date of this Standard is September 22, 1976. As of the effective date, reference to PS 72–76 may be made in contracts, codes, advertising, invoices, product labels, and the like, but no product may be advertised or represented in any manner which would imply or tend to imply approval or endorsement of that product by the National Bureau of Standards, the Department of Commerce, or by the Federal Government.

8. HISTORY OF PROJECT

In November 1972 the initial draft of the toy safety standard was submitted to the National Bureau of Standards by the Toy Manufacturers of America for development as a Voluntary Product Standard. A revised draft was sent in August 1973 to numerous producers, distributors, consumers, and others in order that they could comment on the draft. Based on the comments received by the National Bureau of Standards, the draft was revised. In October 1974 the proposed standard was submitted to the Standard Review Committee. This 15-person committee, composed of five toy producers, five distributors (which included one importer), and five consumer groups, held a meeting in January 1975 at which the committee recommended a number of changes. The proposed standard, dated June 17, 1975, was resubmitted for committee review in June 1975. The committee recommended that the standard be circulated for acceptance to producers, distributors, consumers, and others to determine its acceptability. The standard, designated TS 215b, dated August 29, 1975, was circulated for acceptance in November 1975. A meeting was held by the Standard Review Committee in June 1976 to consider the comments and objections received by the National Bureau of Standards during the circulation to determine the standard's acceptability. Editorial changes to the standard were made based on the recommendations of the committee. PS 72-76, *Toy Safety*, was approved for publication on September 16, 1976, and became effective September 22, 1976.

Technical Standards Coordinator:
Charles W. Devereux, II
Standards Development Services Section
National Bureau of Standards
Washington, D.C. 20234

9. STANDING COMMITTEE

A Standing Committee has been appointed to assist in keeping this Voluntary Product Standard up to date. The names of the members of the committee are available from the Standards Development Services Section, National Bureau of Standards, Washington, D.C. 20234, which serves as the secretariat for the committee.

APPENDIX A

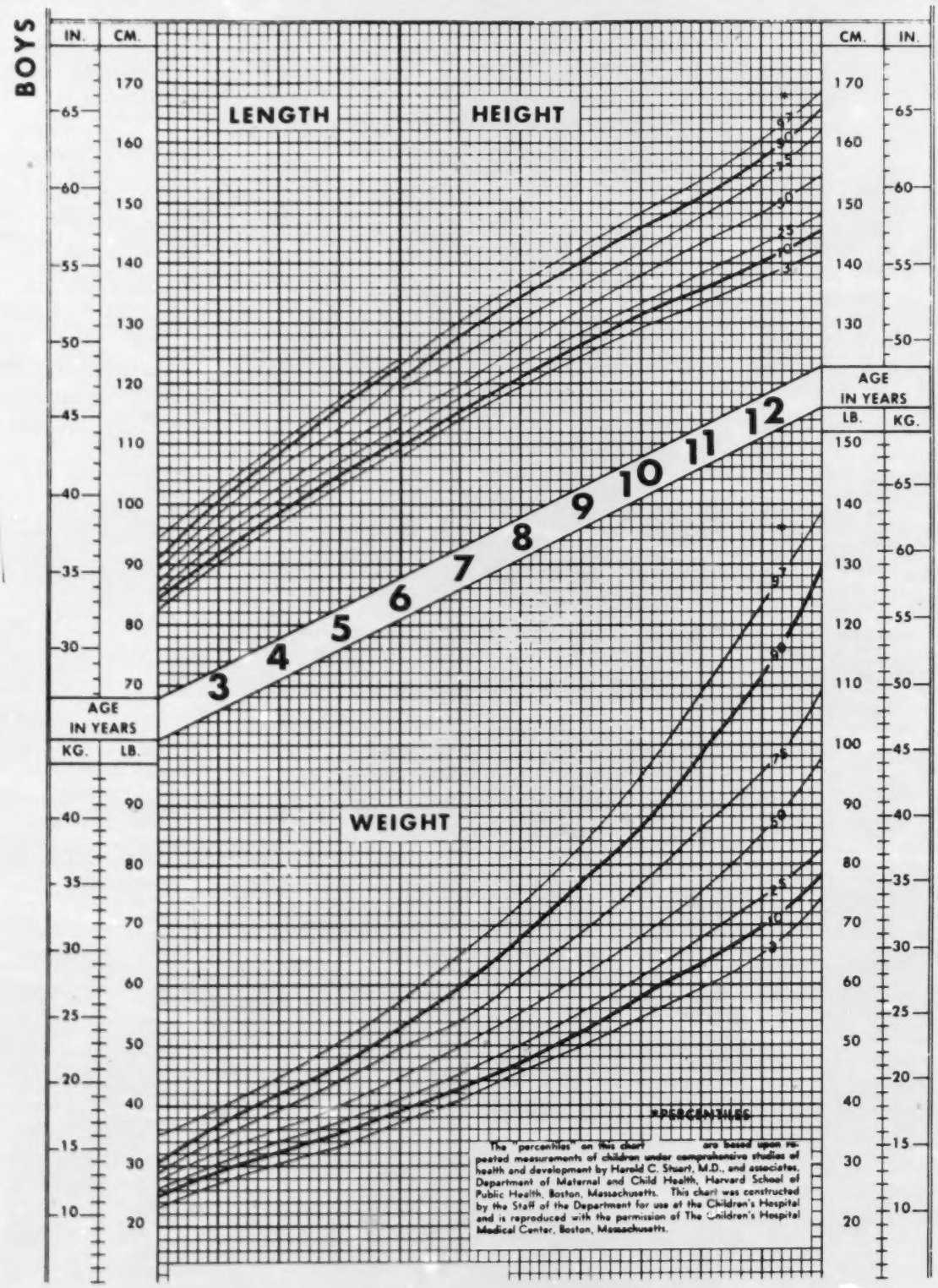
Percentile Charts for Measurements of Boys and Girls

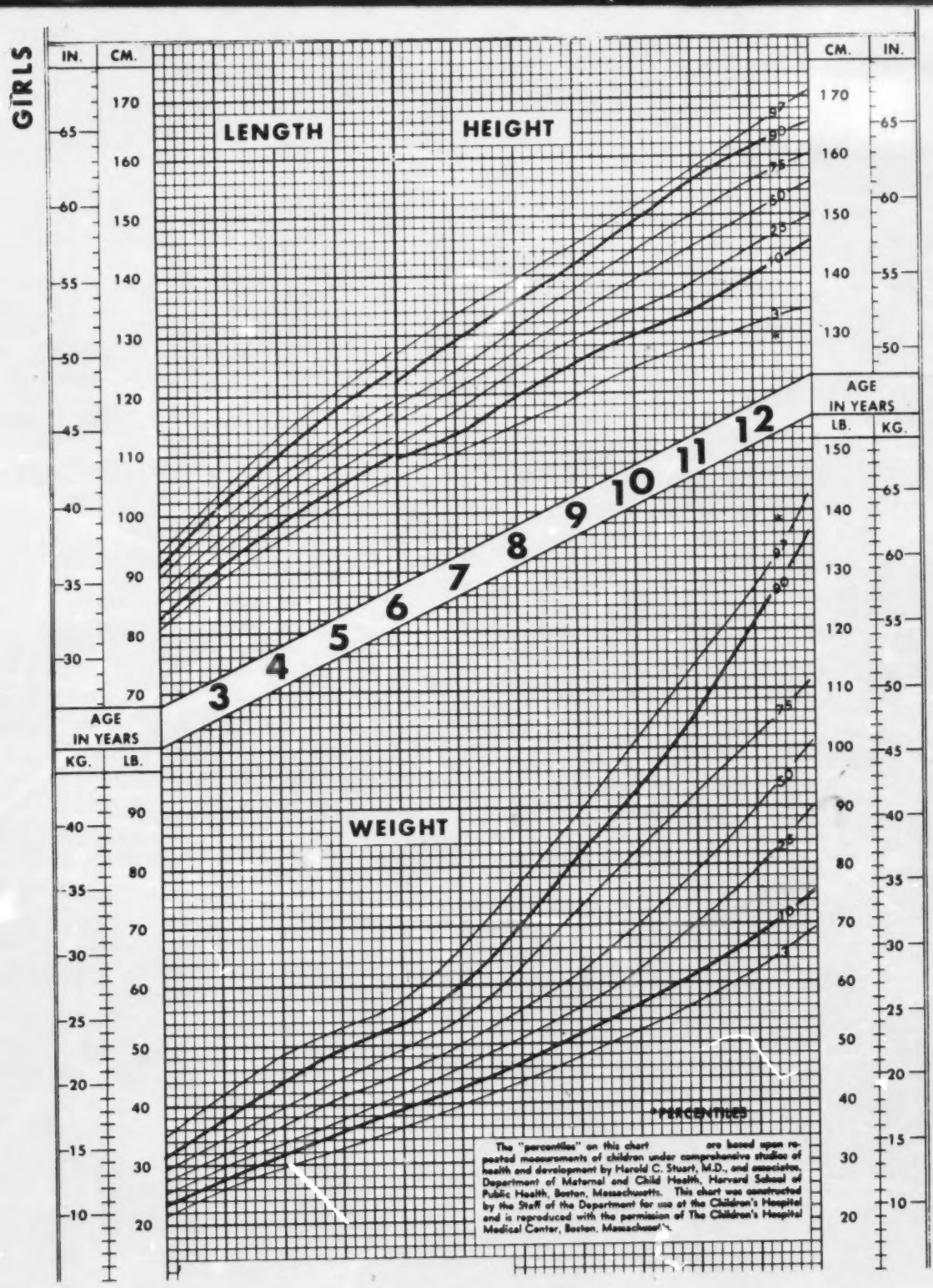
The following charts provide for boys and girls standards of reference for body weight and recumbent length at ages between 2 and 6 years and for weight and standing height from 6 to 13 years. They are based upon repeated measurements at selected ages of a group of more than 100 white boys and more than 100 white girls of North European ancestry living under normal conditions of health and home life in Boston, Mass. The distribution of the measurements obtained from these children at each age is expressed in percentiles, each percentile giving a value which represents a particular position in the normal range of occurrences. The number of the percentile refers to the position which a measurement of the given value would hold in any typical series of 100 children. Thus, the 10th percentile gives the value for the tenth in any hundred; that is, nine children of the same sex and age would be expected to be smaller in the measurement under consideration while 90 would be expected to be larger than the figure given. Similarly the 90th percentile would indicate that 89 children might be expected to be smaller than the figure given while 10 would be larger. The 50th percentile represents the median or mid-position in the customary range. Here, the 10th and 90th percentiles are represented in heavy lines to show the limits within which most children remain. The lighter lines in the graphs divide the distribution into segments for ready recognition and description of individual differences as well as of the "regularity" of progress. The 3rd and 97th percentiles represent unusual though not necessarily abnormal findings.

In line with common usage in the United States, the charts are ruled on a scale in pounds to represent weight. They are ruled, however, in centimeters to represent length under 6 years and

height thereafter, because this scale facilitates accuracy in measuring and recording and centimeter rules and tapes are readily available. For the convenience of those preferring them, scales for kilograms and inches are placed outside of the principal scales and paralleling them. Therefore, if weights are taken in kilograms and lengths and heights in inches, they may be plotted directly without conversion by placing a ruler at the appropriate points on the outer scales of the chart.

To determine the percentile position of any measurement at a given age, the vertical age line is located and a dot is placed where this intersects the horizontal line representing the value obtained from the measurement. Vertical lines give age by 2-month intervals and horizontal lines by 2-pound and 2-centimeter intervals. This permits by interpolation accurate placement for age to 1/2 month and for measurements to 1/2 pound or 0.5 centimeter.


BOYS
IN.
CM.
LENGTH
HEIGHT
CM.
IN.
AGE IN YEARS
3 4 5 6 7 8 9 10 11 12
KG.
LB.
WEIGHT
LB.
KG.
*PERCENTILES
The "percentiles" on this chart are based upon repeated measurements of children under comprehensive studies of health and development by Harold C. Stuart, M.D., and associates, Department of Maternal and Child Health, Harvard School of Public Health, Boston, Massachusetts. This chart was constructed by the Staff of the Department for use at the Children's Hospital and is reproduced with the permission of The Children's Hospital Medical Center, Boston, Massachusetts.


GIRLS
IN.
CM.
LENGTH
HEIGHT
97
90
75
50
25
10
3
AGE IN YEARS
3 4 5 6 7 8 9 10 11 12
KG.
LB.
WEIGHT
PERCENTILES
The "percentiles" on this chart are based upon repeated measurements of children under comprehensive studies of health and development by Harold C. Stuart, M.D., and associates, Department of Maternal and Child Health, Harvard School of Public Health, Boston, Massachusetts. This chart was constructed by the Staff of the Department for use at the Children's Hospital and is reproduced with the permission of The Children's Hospital Medical Center, Boston, Massachusetts.

APPENDIX B

Packaging and Shipping

B.1 Packaging—Packages that are intended to be opened by adult purchasers should be so constructed as to avoid hazards during the opening process from metal fasteners, particularly staples, and should not contain common pins used to position the toy within the package.

B.2. Shipping—Packaged and unpackaged toys can be subjected to a wide variety of tests designed to test the ability of toys to withstand the destructive forces encountered in the distribution cycle. The tests most widely used include drop, vibration, compression, and incline impact. For many toys, especially those that are of light weight and constructed of resilient materials, such as dolls and stuffed toys, limited testing may be sufficient. Others, however, such as large plastic or heavy metal toys, may be damaged during shipment and should be subjected to appropriate tests. Guidance for useful tests can be obtained from the following American Society for Testing and Materials (ASTM) sources (all of these are available from the American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pa. 19103):

ASTM D 775 — *Drop Test for Shipping Containers*
ASTM D 880 — *Incline Impact Test for Shipping Containers*
ASTM D 642 — *Compression Test for Shipping Containers*
ASTM D 999 — *Vibration Test for Shipping Containers*

APPENDIX C

Source Materials

This appendix lists publications that are referred to in this Standard.

Office of the Federal Register, General Services Administration. *Code of Federal Regulations, Title 16—Commercial Practices, Parts 1500 and 1505.* Single copies available free of charge from the Bureau of Compliance, Consumer Product Safety Commission, Washington, D.C. 20207.

Consumer Product Safety Commission. *Rules and Regulations Under the Flammable Fabrics Act.* Available free of charge from the Bureau of Education and Information, Consumer Product Safety Commission, Washington, D.C. 20207.

Federal Trade Commission. *Rules and Regulations Under the Flammable Fabrics Act.* Available from the Office of Public Information, Federal Trade Commission, Washington, D.C. 20580. Free of charge.

U.S. Food and Drug Administration *Requirements of the Federal Food, Drug, and Cosmetic Act*, revised 1970. Available as HE 20.4015.2, from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Price: $0.35.

Office of the Federal Register, General Services Administration. *Code of Federal Regulations, Title 21—Food and Drugs, Parts 120-129*, revised as of January 1, 1972. Available from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Price: $1.50.

U.S. Public Health Service. *Public Health Service Drinking Water Standards*, revised 1962. Available from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Price: $0.30.

Association of Official Analytical Chemists. *Official Method of Analysis of the Association of Official Analytical Chemists.* Available from the Association of Official Analytical Chemists, Box 540, Benjamin Franklin Station, Washington, D.C. 20044. Price: $40.

American Society for Testing and Materials. *Standard Methods of Test for Thickness of Solid Electrical Insulation*, D 374-68. Available from the American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pa. 19103. Price: $1.75.

American Association of Textile Chemists and Colorists. *Technical Manual of the American Association of Textile Chemists and Colorists.* Available from the National Headquarters, American Association of Textile Chemists and Colorists, P.O. Box 12215, Research Triangle Park, North Carolina 27709. Price: $15.

U.S. General Services Administration. *Tile, Floor; Asphalt, Rubber, Vinyl, Vinyl-Asbestos*, Federal Specification SST-312A, June 2, 1966. Available from Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Price: $0.05.

National Archives and Records Services, U.S. General Services Administration, *Federal Regis-*

ter. Available from Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Price: $0.75 an issue, or $5 a month, or $45 a year.

U.S. Department of Commerce. Commercial Standard CS 191-53, *Flammability of Clothing Textiles*. Available from Standards Development Services Section, National Bureau of Standards, Washington, D.C. 20234. Free of charge.

APPENDIX D

Metric Equivalents

The conversion factors and units contained in this appendix are in accordance with the International System of Units (abbreviated SI for Système International d'Unités). The SI was defined and given official status by the 11th General Conference on Weights and Measures which met in Paris in October 1960. For assistance in converting U.S. customary units to SI units, see ASTM E 380, *ASTM Standard Metric Practice Guide*, available from the American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pa. 19103. The conversion factors for the units found in this Standard are as follows:

1 inch = 25.4 millimeters
1 foot = 0.3048 meter
1 square inch = 6.4516 square centimeters
1 ounce (mass) = 28.349 5 grams
1 pound (mass) = 0.453 6 kilogram
1 pound (force) = 4.448 newtons
1 pound per square inch = $6.894\ 8 \times 10^3$ pascals (N/m^2)
1 inch-pound (torque) = 0.1130 newton meter
1 fluid ounce = 29.573 5 milliliters
1 cubic inch = 16.3871 cubic centimeters
1 cubic foot = 0.0283 cubic meter
$t_C = (t_F - 32)/1.8$
where: t_C = temperature in degrees Celsius
t_F = temperature in degrees Farenheit

APPENDIX E

Guide to Standard by Toy Categories

The following table identifies those parts of the Standard that are of particular importance to specific toy categories. This is for convenience only and it must not be assumed that the rest of the Standard can be ignored, particularly since each category contains a wide variety of toy types and constructions.

Toy Category \ Requirements of Standard	4.2. Materials quality	4.3. Flammability	4.4. Toxicology	4.5. Packaging film	4.6. Strings, elastics	4.7. Electrical/Thermal	4.8. Acoustical	4.9. Edges	4.10. Points	4.11. Rigid projections	4.12. Wheels, tires, axles	4.13. Folding mechanisms & hinges	4.14. Holes, clearances & protective mechanisms	4.15. Stability of ride-on toys	4.16. Overload requirements for ride-on toys and seats	4.17. Tipping of stationary floor toys	4.18. Confined spaces	4.19. Small objects	4.20. Simulated protective devices	4.21. Projectiles	4.22. Labeling, literature, marking (except for 4.22.2)	4.22.2. Flotation toys	5.2. Hazardous substance content	5.3+5.10.Use & abuse testing	5.4.1.Washable toys	5.6.4.1. Tipover test for large bulky toys	5.6.5. Projectiles (impact test)	5.6.6. Wheeled toys (impact test)	5.11. Wheels, tires, and axles	5.12. Wire bending test	5.13. Test for mouth actuated toys	5.14. Impact test (head enclosing toys	Appendix B
Infants' crib toys	X	X	X	X	X			X	X	X			X					X			X		X	X	X				X	X			X
Stuffed toys, dolls	X	X	X	X	X				X				X					X			X		X	X	X					X			X
Dolls clothing & accessories	X	X	X	X	X													X			X		X	X	X								X
Mouth-actuated toys	X		X	X			X	X	X				X					X			X		X	X							X		X
Musical toys (Mechanical)	X		X	X	X		X	X	X				X					X			X		X	X									X
Wood & plastic preschool toys	X		X	X	X			X	X	X	X		X					X			X		X	X					X				X
Doll houses & furniture	X	X	X	X				X	X	X			X			X		X			X		X	X		X							X
Ride-on toys (Stationary)	X		X	X				X	X	X		X	X	X	X						X		X	X									X
Ride-on toys (Wheeled)	X		X	X				X	X	X	X	X	X	X	X						X		X	X				X	X				X
Nonriding transportation toys	X		X	X				X	X	X	X		X					X			X		X	X					X				X
Housekeeping toys & toy furniture (nonelectrical)	X	X	X	X				X	X	X		X	X			X	X				X		X	X		X							X
Building & construction kits	X	X	X	X				X	X			X	X					X			X		X	X									X
Toy guns & projectiles	X		X	X			X	X	X	X			X					X		X	X		X	X			X						X
Water, pool toys	X		X	X																	X	X	X	X									X
Costumes & disguises	X	X	X	X													X		X		X		X	X	X								X
Helmets, goggles	X	X	X					X	X	X							X		X		X		X	X								X	X
Games, puzzles, books	X	X	X	X		X												X			X		X	X									X
Games, mechanical	X	X	X	X		X	X	X	X	X		X	X				X	X		X	X		X	X									X
Electrical toys (115V)	X	X	X	X		X		X	X	X			X			X		X			X		X	X		X							X

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To begin publication as a single journal, July-August, 1977

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NOTE: At present the principal publication outlet for these data is the Journal of Physical and Chemical Reference Data (JPCRD) published quarterly for NBS by the American Chemical Society (ACS) and the American Institute of Physics (AIP). Subscriptions, reprints, and supplements available from ACS, 1155 Sixteenth St. N.W., Wash. D. C. 20056.

Building Science Series—Disseminates technical information developed at the Bureau on building materials, components, systems, and whole structures. The series presents research results, test methods, and performance criteria related to the structural and environmental functions and the durability and safety characteristics of building elements and systems.

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Voluntary Product Standards—Developed under procedures published by the Department of Commerce in Part 10, Title 15, of the Code of Federal Regulations. The purpose of the standards is to establish nationally recognized requirements for products, and to provide all concerned interests with a basis for common understanding of the characteristics of the products. NBS administers this program as a supplement to the activities of the private sector standardizing organizations.

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NBS Interagency Reports (NBSIR)—A special series of interim or final reports on work performed by NBS for outside sponsors (both government and non-government). In general, initial distribution is handled by the sponsor; public distribution is by the National Technical Information Services (Springfield, Va. 22161) in paper copy or microfiche form.

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